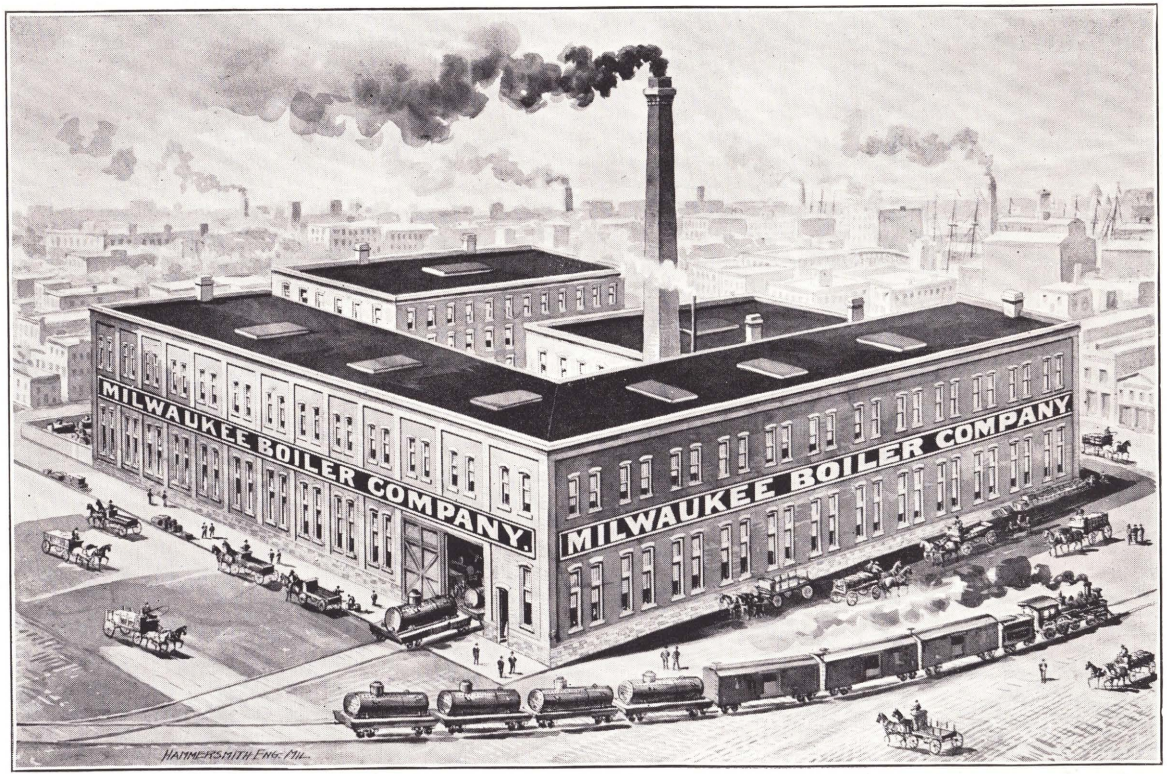
BOILERS

BUILT BY

THE MILWAUKEE BOILER CO.

MILWAUKEE, WIS.

U. S. A.


MILWAUKEE BOILER COMPANY.
MILWAUKEE BOILER COMPANY.
HAMMERSMITH ENG. MIL.

ILLUSTRATED CATALOGUE No. 4

OF

BOILERS AND FIXTURES

MANUFACTURED BY

THE MILWAUKEE BOILER COMPANY.

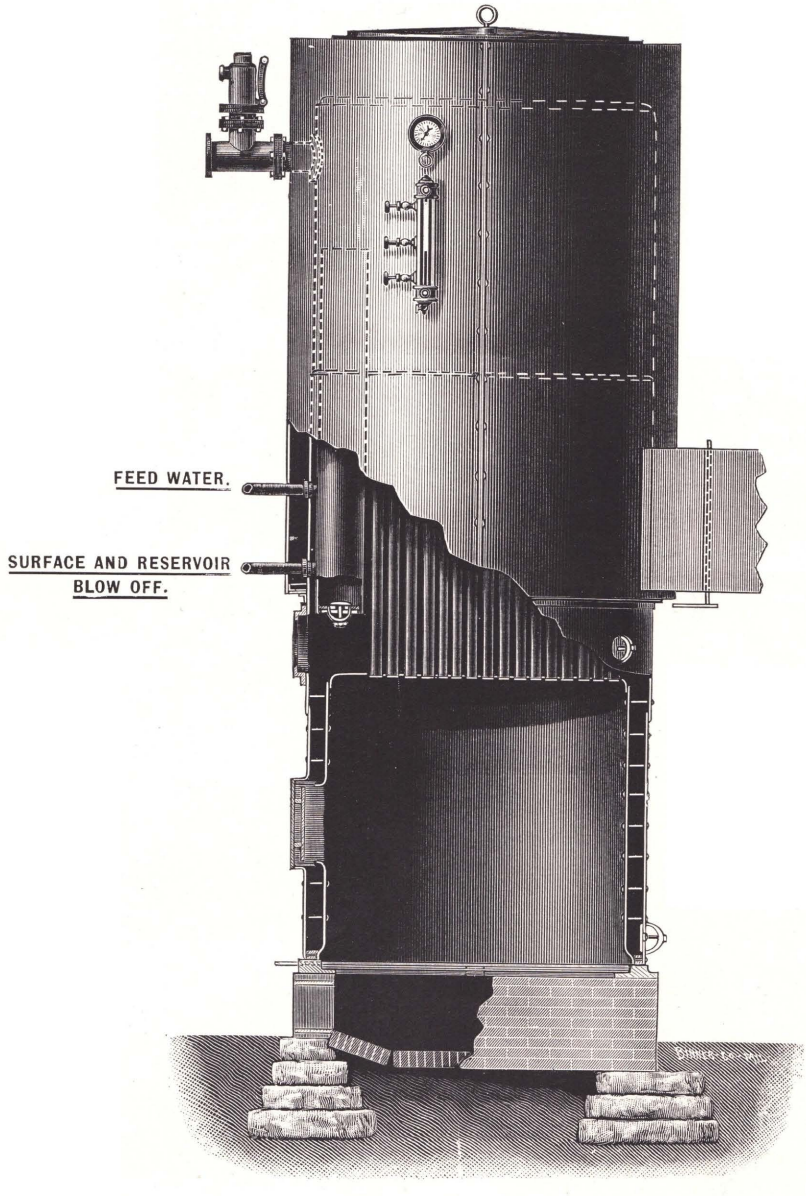
EDWIN REYNOLDS, President.
JAMES S. CHURCH, Vice-President.

W. D. JOHNSON, Secretary.

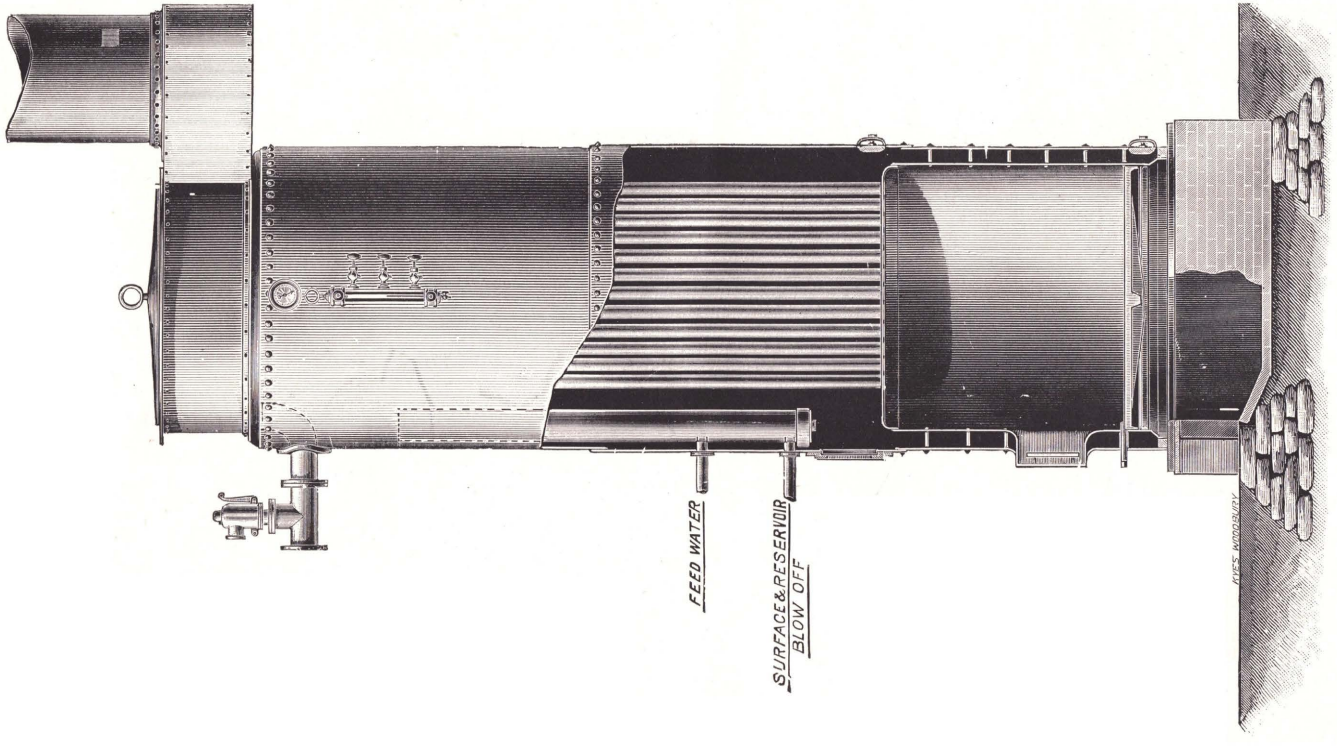
WM. W. ALLIS, Treasurer.
CHAS. ALLIS, Ass't. Treasurer.

MILWAUKEE, WIS., U. S. A.

July 1st, 1903.

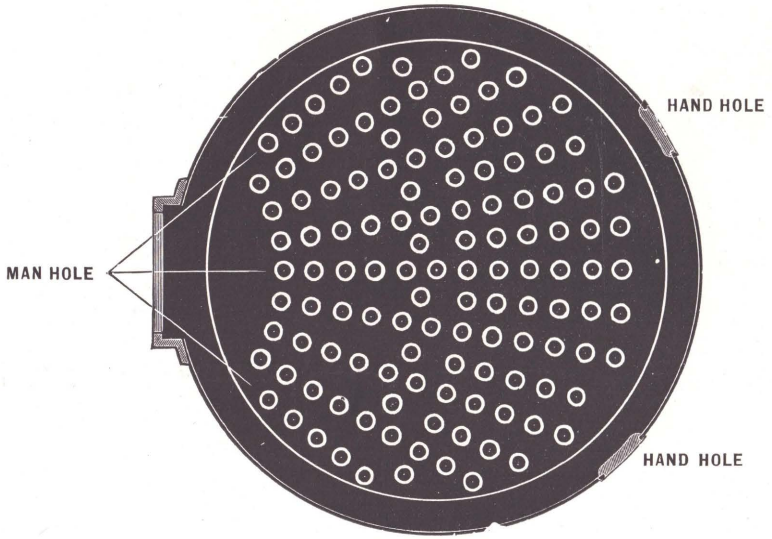


Reynolds Patent Vertical Boiler with Jacket.



Reynolds' Patent Vertical Boiler without Jacket.

REYNOLDS' PATENT VERTICAL BOILER.



Tube Sheet.

The tubes in these boilers are set in rows, radiating from a large man hole located over the fire door and bottom tube sheet, consequently every flue in all parts of both tube sheets can be inspected and cleaned when the man hole cover is removed. Hand holes are located opposite the man hole for admitting light for inspecting and inserting a hose nozzle for washing the tubes and crown sheet. Hand holes are placed at intervals around the base where sediment collected in the water legs may be removed. The feed water is pumped into the

internal reservoir through the feed pipe; this reservoir being closed at the bottom, the discharge into the boiler is over the top, and it being so much larger than the feed pipe, the current upward is very slow, consequently the feed water gains the same temperature as the water in the boiler before it is discharged into the boiler. The action is effective in precipitating nearly all of the heavy impurities carried in with the feed water, which can be blown out of the reservoir by a blow-off arranged for this purpose. By carrying the water in the boiler slightly above the top of the reservoir, it can then be utilized as a surface blow-off to free the boiler of scum or light impurities collected on the surface of the water.

The smoke hood on top of the boiler is furnished with a revolving top having a removable cover. For the purpose of cleaning the flues this cover is removed, and only a small portion of the total number of flues are exposed at one time; this arrangement enables the fireman to clean the flues while the boilers are in operation. This type of boiler is especially adapted to locations where floor space is valuable, as from 300 to 400 H. P. of vertical boilers can be located in the space required by an ordinary horizontal tubular boiler of 100 H. P. capacity. A comparison of the cost of placing a Reynolds' patent vertical and a common horizontal tubular boiler in a power plant ready for operation will show that the vertical boiler can be erected at much less cost than the horizontal, the latter requiring from $300 to $400 worth of masonry work while the former requires less than $20 worth of masonry.

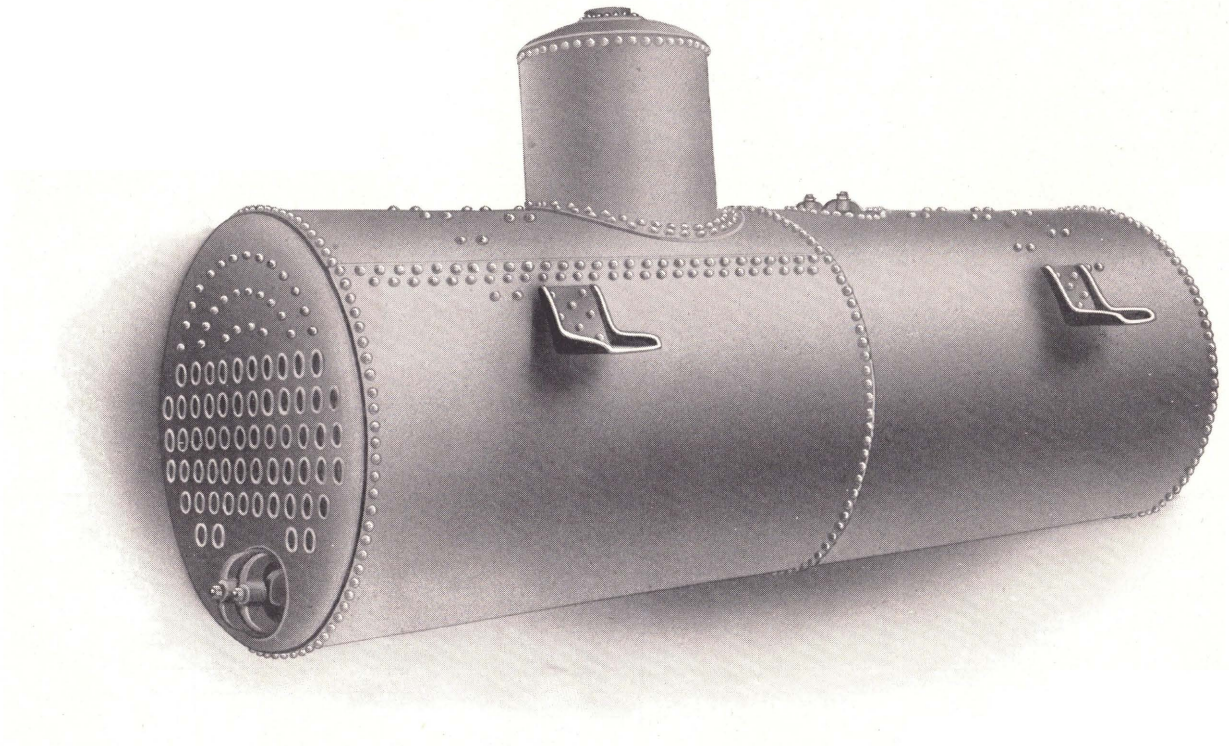
We can make changes in the shape of the fire box to adapt it for burning cord wood or any kind of fuel. All the material and workmanship used in the construction of these boilers is first-class, and they can be made to carry any steam pressure required.

We furnish these boilers with a full list of fittings and fixtures and arrange the smoke connections to operate them singly or in batteries of any number. All the advantages of using absolutely dry steam in the engine are to be gained with these boilers; frequent tests have demonstrated that they will furnish steam superheated from 10 to 40 degrees.

LIST OF SIZES—REYNOLDS' PATENT VERTICAL BOILERS.

Horse Power Slide Valve Engine	35 to 50	40 to 55	55 to 70	80 to 100	125 to 185	170 to 225
Horse Power Reynolds' Corliss Engine	40 to 62	50 to 70	65 to 85	100 to 125	140 to 200	200 to 275
Diameter Boiler, inches	48	56	64	72	84	96
High Boiler Shell, feet	14 to 16	14 to 16	14 to 16	16 to 18	16 to 20	16 to 20
Thickness Shell	5/16	5/16	5/16	3/8	7/16	1/2
Thickness Tube Sheets	3/8	3/8	3/8	7/16	7/16	1/2
Number of Tubes	74	84	106	124	203	260
Diameter of Tubes, inches	2	2¼	2¼	2½	2½	2½
Diameter Smoke Stack required, inches	18	21	24	30	36	40
Length Smoke Stack above top boiler, ft	40	40	40	40	40	40

Horse power rating for slide valve engines is based on evaporatlng 30 pounds water per horse power per hour.
Smoke Stacks not included in fixtures with vertical boilers unless specially mentioned.



Standard Horizontal Tubular Boiler for Full Front.

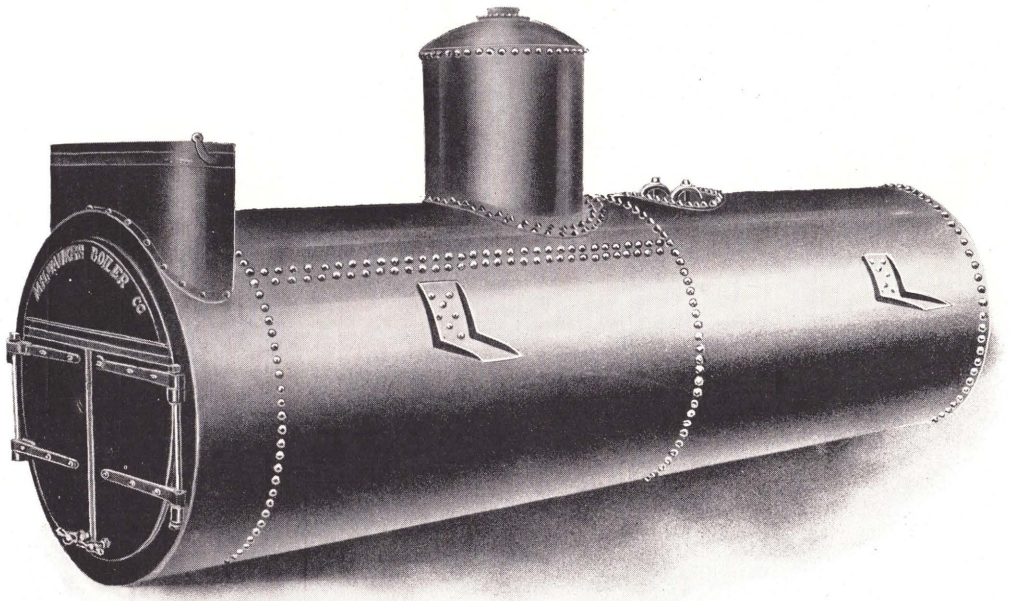
SPECIFICATIONS OF HORIZONTAL TUBULAR BOILERS FOR FULL FRONT.

Number of Size	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Horse Power	20	30	40	45	50	60	70	75	80	95	100	110	125	150
Diameter of boiler...inches	36	42	48	48	48	54	54	60	60	60	66	66	72	72
Length of boiler...feet	10	12	12	14	16	14	16	14	16	18	16	18	16	18
Diameter of tubes...inches	3	3	3	3½	4	3½	4	3½	4	4	4	4	4	4
Number of tubes	26	38	48	34	28	40	34	54	44	44	54	54	70	70
Thickness of shell...inches	¼	¼	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	3/8	3/8	3/8	3/8
Thickness of heads... "	3/8	3/8	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	½	½	½	½
Diameter of dome... "	18	21	24	24	24	27	27	30	30	30	32	32	34	34
Height of dome... "	18	21	24	24	24	27	27	30	30	30	32	32	34	34
Thickness of dome shell... "	¼	¼	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of dome head... "	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16	7/16	7/16
Diameter of stack... "	16	20	24	24	24	28	28	28	28	28	30	30	36	36
Height of stack...feet	30	40	40	40	50	40	50	40	50	50	50	50	50	50
No. of sheet steel in stack	16	16	16	16	16	16	16	16	14	14	14	14	14	14
Length of grates...inches	36	42	48	48	54	48	54	54	54	60	54	60	60	60
Width of grates... "	36	42	48	48	48	54	54	60	60	60	66	66	72	72
Heating surface...sq. feet	270	400	550	570	600	700	800	850	920	1050	1170	1300	1400	1584
Weight naked boiler...pounds	2700	4000	5800	6300	7050	7400	8400	9100	10200	10800	12800	14000	14900	15700
Weight with full front and fixtures... "	6200	8400	10100	11800	12400	13300	14400	15000	17400	18000	20500	21600	23300	24600

SIZE OF FITTINGS FOR HORIZONTAL TUBULAR BOILERS.

Number of Boiler	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Steam Opening...inches	2½	2½	3	3	3½	3½	3½	4	4	4½	5	5	6	6
Pop Safety Valve... "	2	2	2½	2½	3	3	3	3	3	3½	3½	3½	4	4
Whistle... "	3	3	3½	3½	3½	4	4	4	4	4	4	5	5	5
Whistle Valve... "	1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	1½
Blow Off Cock... "	1¼	1½	1½	1½	2	2	2	2	2½	2½	2½	2½	2½	2½
Check and Globe Valve... "	1	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	1½	2	2	2	2

Boilers under 48 ins. diameter have no manhole—handhole under tubes in front head only.
Boilers 48 ins. diameter have handhole under tubes in front head, and manhole in top of shell.
All boilers larger than 48 ins. diameter have two manholes, one in front head below tubes and one on top of shell.
Boilers built to carry 100 lbs. working pressure.
Naked Boiler includes lugs, manholes and handholes only.
See pages 20 and 21 for plan of Brick Setting.



Standard Horizontal Tubular Boiler for Half Arch Fronts.

SPECIFICATIONS OF HORIZONTAL TUBULAR BOILERS FOR HALF ARCH FRONTS.

Number of size	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Horse Power	20	30	40	45	50	60	70	75	80	95	100	110	125	150
Diameter of boiler...inches	38	42	48	48	48	54	54	60	60	60	66	66	72	72
Length of boiler...feet	10	12	12	14	16	14	16	14	16	18	16	18	16	18
Diameter of tubes...inches	3	3	3	3½	4	3½	4	3½	4	4	4	4	4	4
Number of tubes	26	38	48	34	28	40	34	54	44	44	54	54	70	70
Thickness of shell...inches	¼	¼	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	⅜	⅜	⅜	⅜
Thickness of heads... "	⅜	⅜	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	½	½	½	½
Diameter of dome ... "	18	21	24	24	24	27	27	30	30	30	32	32	34	34
Height of dome ... "	18	21	24	24	24	27	27	30	30	30	32	32	34	34
Thickness of dome shell... "	¼	¼	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of dome head... "	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	7/16	7/16	7/16	7/16
Diameter of stack... "	16	20	24	24	24	28	28	28	28	28	30	30	36	36
Height of stack...feet	30	40	40	40	50	40	50	40	50	50	50	50	50	50
No. of sheet steel in stack.	16	16	16	16	16	16	16	16	14	14	14	14	14	14
Length of grates...inches	36	42	48	48	54	48	54	54	54	60	54	60	60	60
Width of grates... "	36	42	48	48	48	54	54	60	60	60	66	66	72	72
Heating surface...sq. feet	270	400	550	570	600	700	800	850	920	1050	1170	1300	1400	1584
Weight naked boiler...pounds	2700	4000	5800	6300	7050	7400	8400	9100	10200	10800	12800	14000	14900	15700
Weight with half front and fixtures... "	5400	7650	9300	11000	11600	12560	13660	14000	16300	17000	19700	20800	22500	23800

SIZE OF FITTINGS FOR HORIZONTAL TUBULAR BOILERS.

Number of Boiler	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Steam Opening...inches	2½	2½	3	3	3½	3½	3½	4	4	4½	5	5	6	6
Pop Safety Valve... "	2	2	2½	2½	3	3	3	3	3	3½	3½	3½	4	4
Whistle ... "	3	3	3½	3½	3½	4	4	4	4	4	4	5	5	5
Whistle Valve... "	1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	1½
Blow Off Cock... "	1¼	1½	1½	1½	2	2	2	2	2½	2½	2½	2½	2½	2½
Check and Globe Valve... "	1	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	1½	2	2	2	2

Boilers under 48 ins. diameter have no manhole—handhole under tubes in front head only.

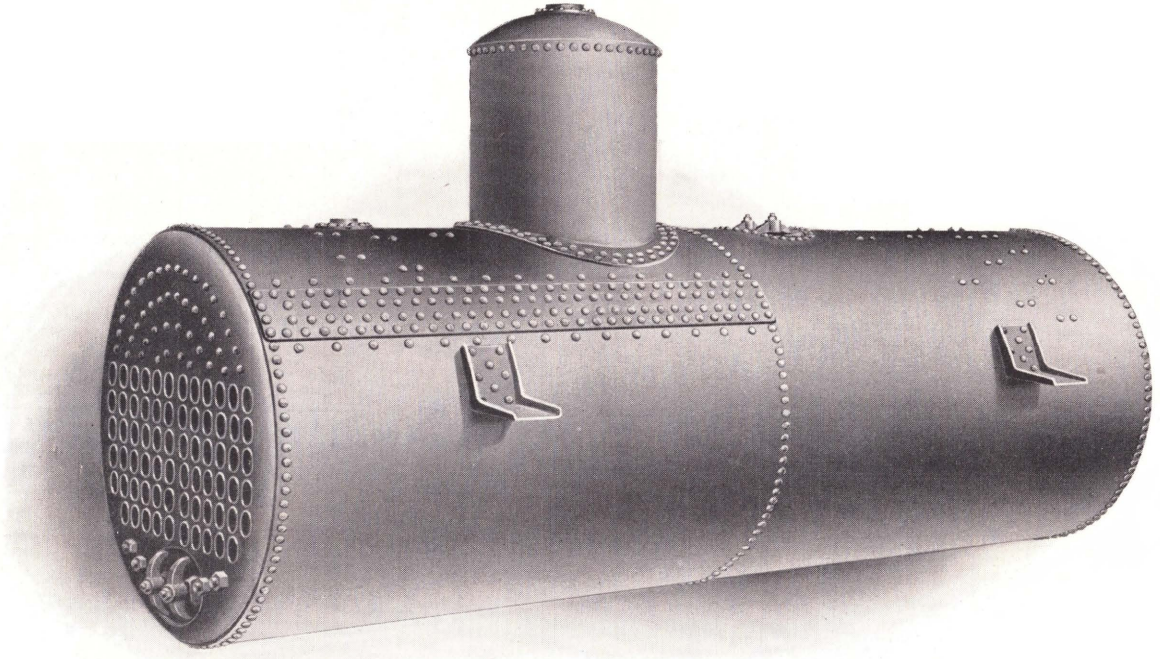
Boilers 48 ins. diameter have handhole under tubes in front head, and manhole in top of shell.

All Boilers larger than 48 ins. diameter have two manholes, one in front head below tubes and one on top of shell.

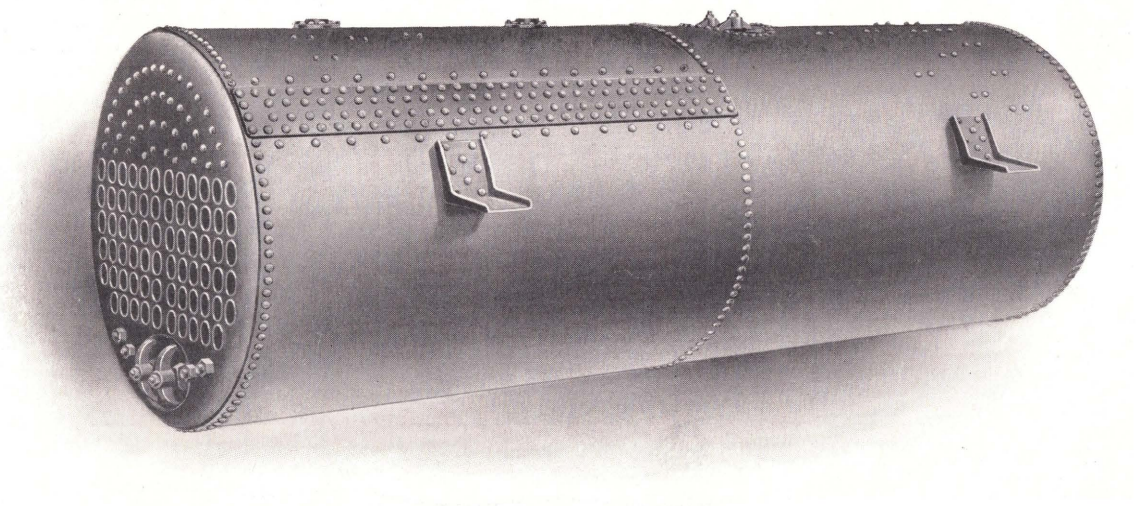
Boilers built to carry 100 lbs. working pressure.

Naked Boiler includes extension door, stack saddle, lugs, manholes and handholes only.

See pages 20 and 21 for plan of Brick Setting.



Horizontal Tubular Boiler for High Pressure.
See Specifications on Page 14.



Horizontal Tubular Boiler for High Pressure.

See Specifications on Page 14.

Specifications of High Pressure Horizontal Tubular Boilers.

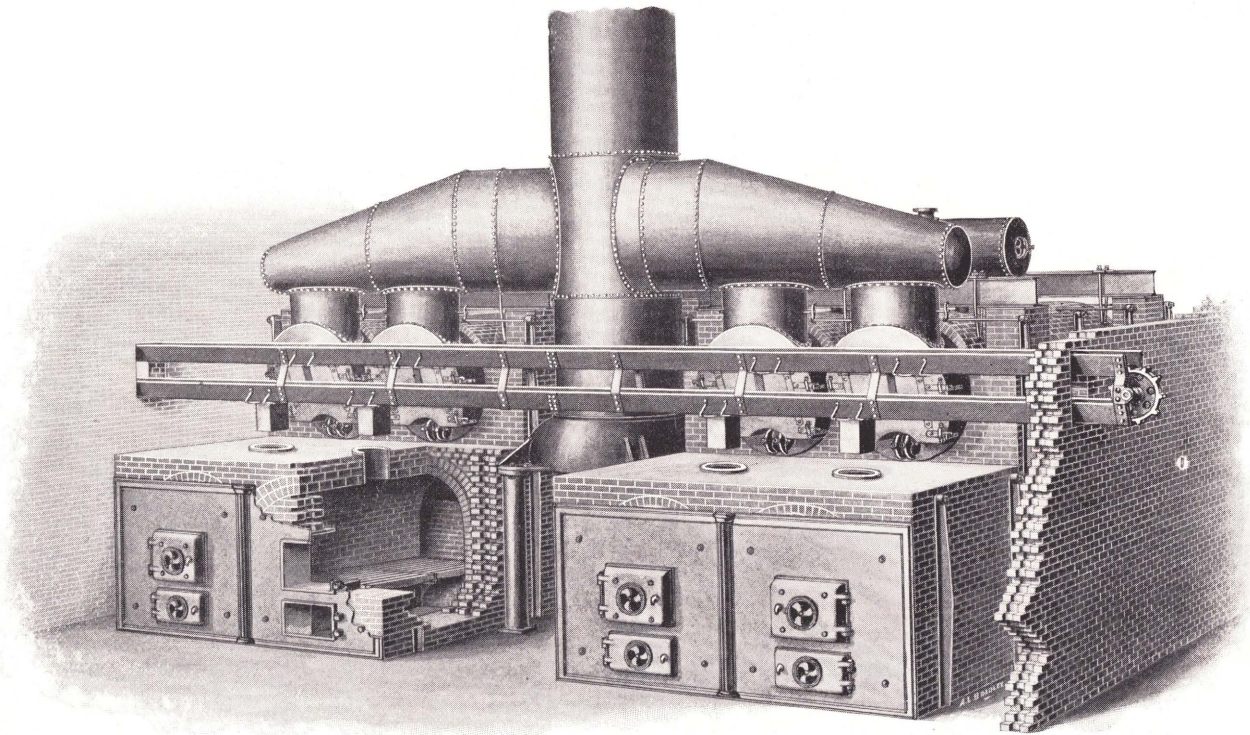
Horse Power	60	70	75	80	95	100	110	125	150
Diameter of Boiler	54	54	60	60	60	66	66	72	72
Length of Boiler	14	16	14	16	18	16	18	16	18
Number of Tubes	40	40	54	44	44	54	54	70	70
Size of Tubes	3½″	3½″	3½″	4″	4″	4″	4″	4″	4″
Thickness of Shell	5/16	5/16	3/8	3/8	3/8	3/8	3/8	7/16	7/16
Thickness of Heads	7/16	7/16	7/16	7/16	7/16	½	½	½	½
Thickness of Dome Shell	5/16	5/16	5/16	5/16	5/16	3/8	3/8	3/8	3/8
Thickness of Dome Head	3/8	3/8	7/16	7/16	7/16	7/16	7/16	7/16	7/16
Weight Naked Boiler	7800	8800	11000	12000	13000	13100	15500	16500	18600

The cuts on pages 12 and 13 show our Horizontal Tubular Boilers designed to carry a higher pressure than our standard boiler.

All shells are made of two plates, each plate forming the entire circumference of the boiler.

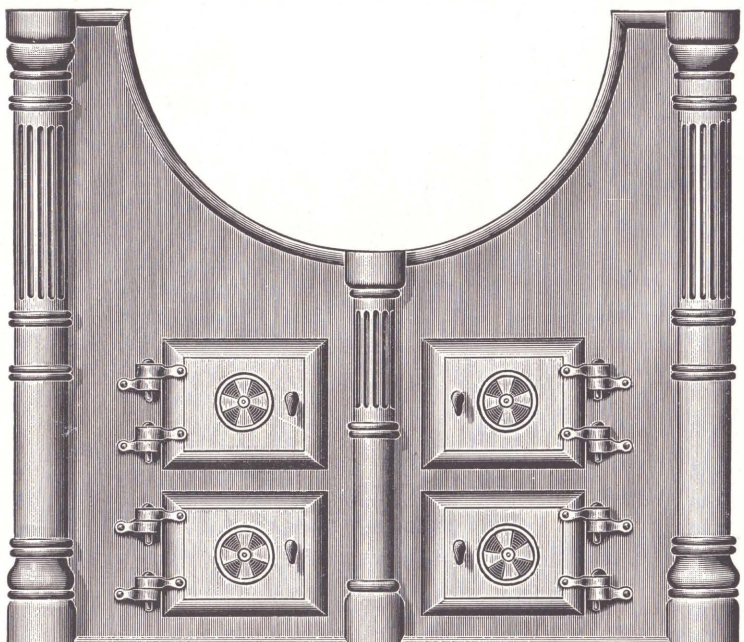
The longitudinal seams are provided with double butt straps and triple riveted.

Each boiler is provided with man hole in front head below tubes, and one in top of shell back of dome; also with separate pressed steel flange for steam outlet and safety valve connection.



The above cut shows a battery of Boilers arranged with "Dutch Oven Fronts" and provided with Saw Dust Feed trough. The Boilers are suspended from steel channels, allowing free expansion and contraction without injury to brick work.

STANDARD HALF FRONT.



STANDARD FULL FRONT.

STANDARD HALF FRONT.

Dimensions and Weight.

Complete setting consists of Front proper, Grates, Grate Rest, Baffle Plates, Dead Plates, Liners, Back Arch Bars, Back Arch Bar Rest, Buckstays, Diamond Washers, Soot Door and Frame, accurately fitted and lettered.

Size of Front in inches.....	72	66	60	54	48	42	36
Height in inches.....	90	83	83	75	72	53	53
Width in inches.....	100	94	94	82	74	68	68
Width Dead Plate & Liners, in	8	8	8	8	8	8	8
Size of Fire Doors.....	20x16	18x14	18x14	18x14	18x14	16x12	16x12
Size of Ash Pit Doors.....	20x16	18x14	18x14	18x14	18x14	16x12	16x12
From Grates to Boiler.....	28	26	26	25	24	22	22
From Grates to Floor.....	26	24	24	23	23	20	20
Grate Surface.....	72x60	66x60	60x60	54x54	48x48	42x42	36x36
Number of Buckstays.....	4	4	4	4	4	4	4
Number of Diamond Washers	4	4	4	4	4	4	4
Size of Soot Door.....	14x18	14x18	14x18	14x18	14x18	14x18	14x18
Weight of Complete Setting...	4800	4300	3900	3500	3200	2600	2200

Above pattern can be altered at slight additional cost.

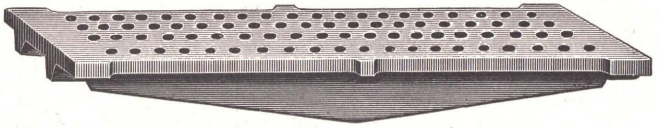
STANDARD FULL FRONT.

Dimensions and Weight.

Complete setting consists of Front proper, Grates, Grate Rest, Dead Plate, Liners, Baffle Plates, Back Arch Bars, Arch Bar Rest, Buckstays, Diamond Washers, Breeching Frame fitted with Damper, Soot Door and Frame. Front accurately fitted and lettered.

Size of Front in inches.....	72	66	60	54	48	42	36
Height in inches.....	133	124	116	112	110	93	90
Width in inches.....	100	94	88	82	76	70	64
Size of Soot Door.....	14x18	14x18	14x18	14x18	14x18	14x18	14x18
Size of Fire Doors.....	20x16	18x14	18x14	18x14	18x14	16x12	12x14
Size of Ash Pit Doors	20x16	18x14	18x14	18x14	18x14	16x12	12x14
Width Dead Plate in ins...	16	16	16	16	16	12	12
From Grates to Boiler.....	28	26	25	24	24	20	20
From Grates to Floor.....	26	24	24	23	23	22	22
Grate Surface.....	72x60	66x60	60x60	54x54	48x48	42x42	36x36
Size of Flue Door Opening	68x52	61x44	61x44	49x36	48x36	42x30	36x28
Number of Buckstays.....	4	4	4	4	4	4	4
Number of Diamond Washers	4	4	4	4	4	4	4
Weight of Complete Setting...	6200	5600	5200	4500	3900	3300	3000

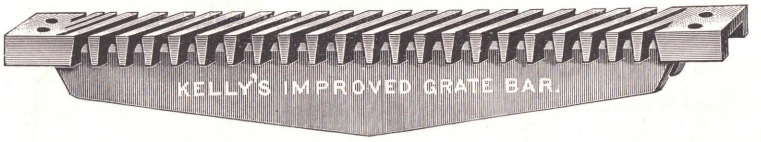
BOILER CASTINGS.



No. 1.

No. 2.

No. 3.



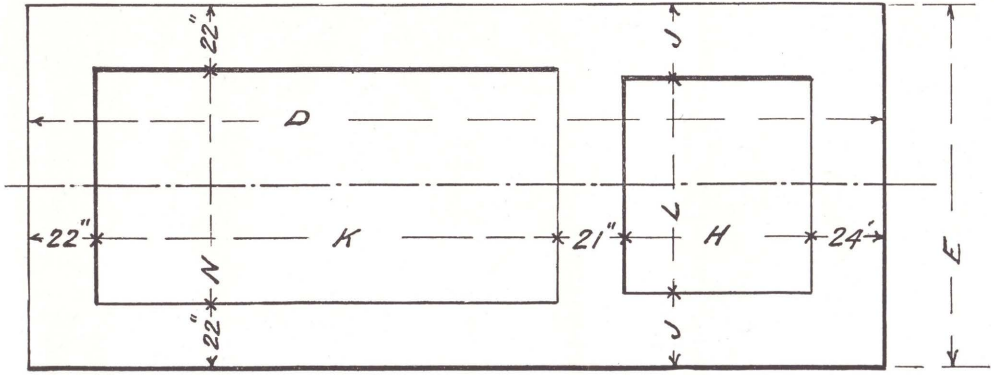
No. 4.

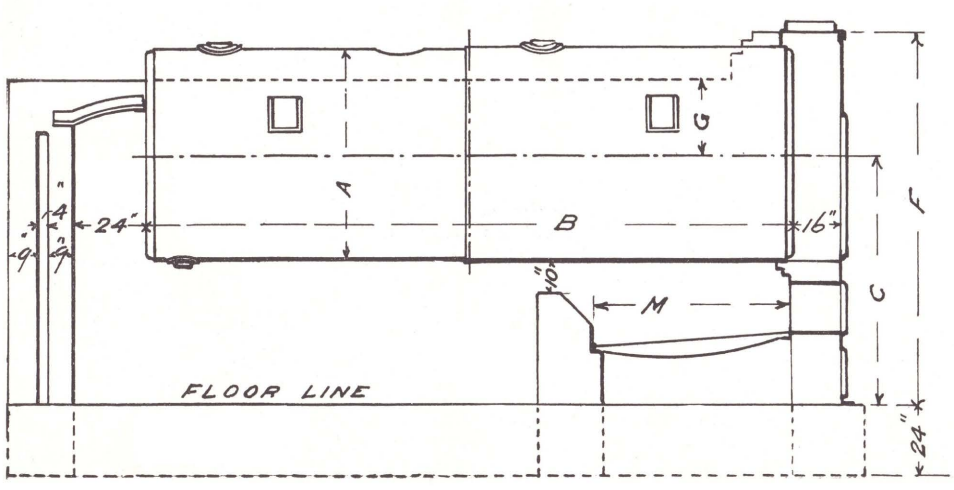
No. 1 Perforated Grate for burning Saw Dust.

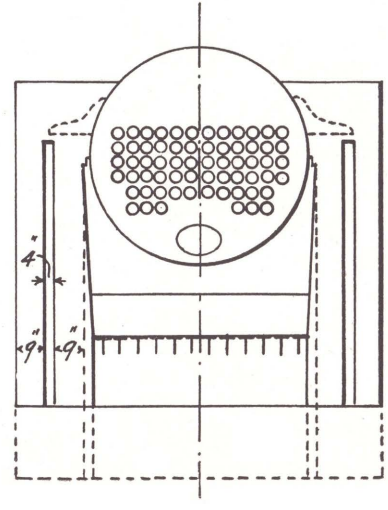
No. 2 Standard "V" or "Tupper" Grate furnished with all Standard Boilers unless otherwise specified.

No. 3 Straight Bar Grate. This Grate will be furnished with Standard Boilers without extra charge if desired.

No. 4 Kelly Improved Grate. Can be furnished in any lengths. Uniform width 6 inches. This Grate is recommended where economy of fuel and good combustion is desired,


22"
D
J
22"
K
21"
L
H
24"
E
N
22"
J


G
A
4"
24"
B
16"
9"
9"
10"
M
C
F
FLOOR LINE
24"


4"
9"
9"

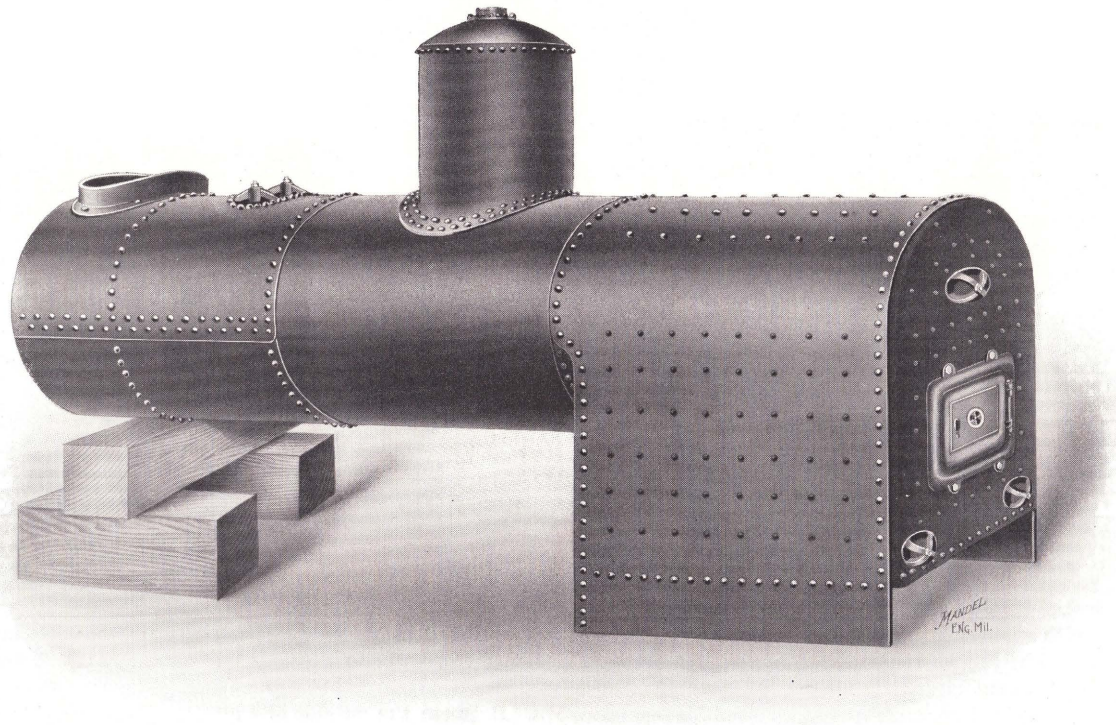
Measurements for Setting Stationary Tubular Boilers with Full Flush Front.

Letters refer to Measurements for Corresponding Letters on Diagram.

No.	A	B	D	E	F	G	H	J	K	L	M	N	Fire Brick	Common Brick
1	3′ 2″	10′ 0″	15′ 10″	7′ 4″	7′ 0″	12″	2′ 10″	2′ 1″	7′ 5″	3′ 2″	3′ 0″	3′ 8″	500	6000
2	3′ 6″	12′ 0″	17′ 10″	7′ 8″	7′ 6″	12″	3′ 4″	2′ 1″	8′ 11″	3′ 6″	3′ 6″	4′ 0″	750	10000
3	4′ 0″	12′ 0″	17′ 10″	8′ 2″	7′ 10″	15″	3′ 4″	2′ 1″	8′ 11″	4′ 0″	3′ 6″	4′ 6″	1000	13000
4	4′ 0″	14′ 0″	19′ 10″	8′ 2″	7′ 10″	15″	3′ 10″	2′ 1″	10′ 5″	4′ 0″	4′ 0″	4′ 6″	1000	14000
5	4′ 0″	16′ 0″	21′ 10″	8′ 2″	7′ 10″	15″	4′ 4″	2′ 1″	11′ 11″	4′ 0″	4′ 6″	4′ 6″	1000	15000
6	4′ 6″	14′ 0″	19′ 10″	8′ 8″	9′ 0″	17″	3′ 10″	2′ 1″	10′ 5″	4′ 8″	4′ 0″	5′ 0″	1200	15000
7	4′ 6″	16′ 0″	21′ 10″	8′ 8″	9′ 0″	17″	4′ 4″	2′ 1″	11′ 11″	4′ 8″	4′ 6″	5′ 0″	1200	16000
8	5′ 0″	14′ 0″	19′ 10″	9′ 2″	9′ 3½″	20″	3′ 10″	2′ 1″	10′ 5″	5′ 0″	4′ 0″	5′ 6″	1300	16000
9	5′ 0″	16′ 0″	21′ 10″	9′ 2″	9′ 3½″	20″	4′ 4″	2′ 1″	11′ 11″	5′ 0″	4′ 6″	5′ 6″	1300	17500
10	5′ 0″	16′ 0″	23′ 10″	9′ 2″	9′ 3½″	20″	4′ 10″	2′ 1″	13′ 5″	5′ 0″	5′ 0″	5′ 6″	1300	19000
11	5′ 6″	16′ 0″	21′ 10″	9′ 8″	10′ 0″	24″	4′ 4″	2′ 1″	11′ 11″	5′ 8″	4′ 6″	6′ 0″	1400	20000
12	5′ 6″	18′ 0″	23′ 10″	9′ 8″	10′ 0″	24″	4′ 10″	2′ 1″	13′ 5″	5′ 8″	5′ 0″	6′ 0″	1400	20000
13	6′ 0″	16′ 0″	21′ 10″	10′ 2″	10′ 5″	24″	4′ 10″	2′ 1″	11′ 5″	6′ 0″	5′ 0″	6′ 6″	1600	21000
14	6′ 0″	18′ 0″	23′ 10″	10′ 2″	10′ 5″	24″	4′ 10″	2′ 1″	13′ 5″	6′ 0″	5′ 0″	6′ 6″	1600	22000

DIRECTIONS FOR SETTING.

Make the excavation to table, of depth suitable to ground upon which it is to rest, not less than 24″. Build foundation walls to floor level and fill in between with solid filling. Set Boiler in place and block it up three or four inches higher that it is to remain. Carry up the side and end walls to the proper height for the resting places of brackets, leaving headers in the side walls so that bridge wall may be tied to them. Allow the work to stand a sufficient time for the walls to settle and harden, say six or eight days. When walls are dry, let Boiler down until brackets rest in their proper place, remove blocking and finish brick work. Between the outside and inside walls there is a space of four inches, this allows the inside walls to expand and contact without injury to the outer wall. These walls should have headers run from wall to wall every two feet, but not tied together. It is preferable to line the entire furnace and combustion chamber with fire brick, laid in such manner that repairs can be made easily if necessary. The back arch is carried on arch bars, and any part may be removed without disturbing the rest.



Portable Fire Box Boiler.

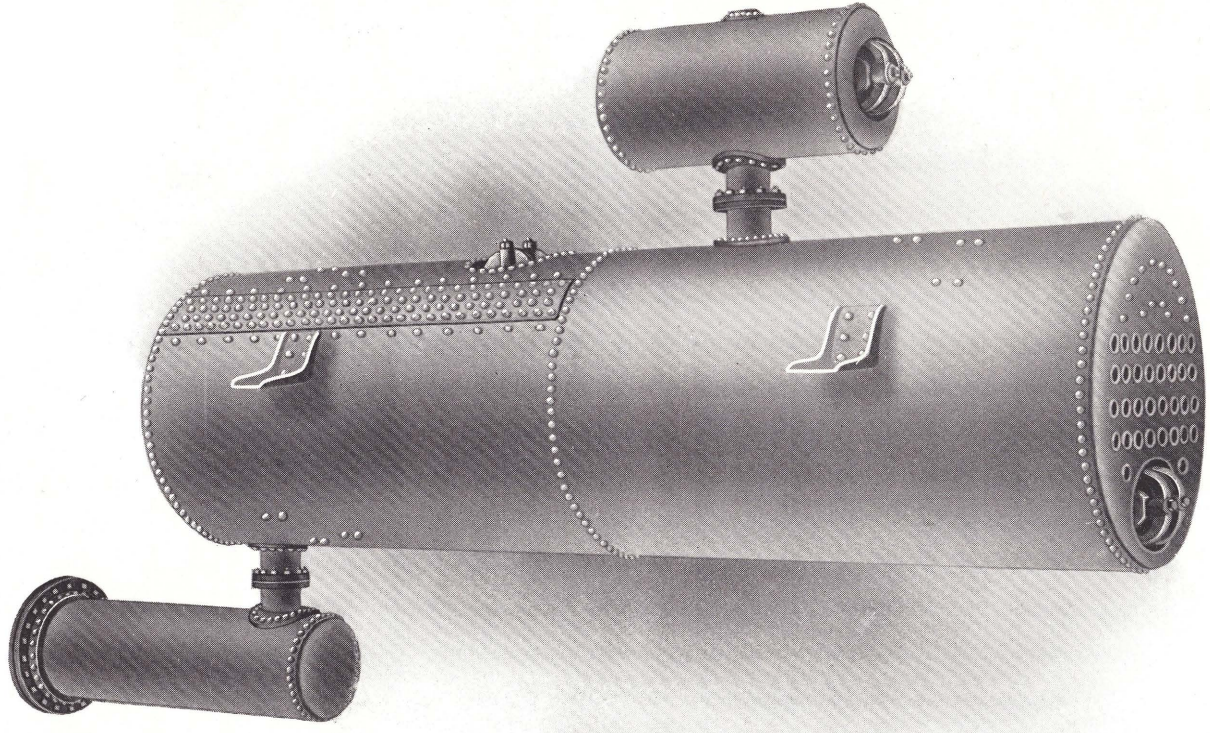
SPECIFICATIONS OF PORTABLE FIRE BOX BOILERS.

Number of Size	1	2	3	4	5	6	7	8	9	10	11
Horse Power	25	30	35	40	45	50	60	70	80	90	100
Diameter of boiler	36	42	44	44	48	48	48	54	54	60	60
Length over all inches	165	161	167	185	195	213	255	201	229	257	269
Length of tubes "	96	90	96	114	114	132	174	120	144	168	180
Number of 3" tubes	33	44	46	46	48	48	48	76	76	101	101
Diameter of dome inches	18	20	22	22	24	24	24	28	28	30	30
Height of dome "	18	20	22	22	24	24	24	28	28	30	30
Diameter of stack "	18	20	22	22	24	24	24	28	28	28	28
Length of stack feet	25	25	25	25	25	35	35	35	35	40	45
Thickness of shell inches	¼	¼	¼	¼	9/32	9/32	9/32	5/16	5/16	11/32	11/32
Thickness of head & tube sheets "	3/8	3/8	3/8	3/8	7/16	7/16	7/16	7/16	7/16	7/16	7/16
Thickness of fire box sheet "	¼	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Depth of water leg "	14	14	15	15	16	16	16	18	18	20	20
Height of fire box "	38	42	44	44	48	48	48	54	54	60	60
Length of fire box "	52	52	52	52	60	60	60	60	64	66	66
Width of fire box "	30	36	38	38	42	42	42	48	48	54	54
Grate surface square feet	10.8	13	13.7	13.7	17.5	17 5	17.5	20	21.3	24 3	24 3
Heating surface " "	262	326	361	415	447	504	546	597	710	1235	1314
Size of pop safety valve inches	2½	2½	2½	3	3	3½	3½	3½	4	4	4½
Size of blow off "	1½	1½	1½	1½	1½	1½	1½	1½	2	2	2½
Weight complete	6400	7800	9000	9600	10800	11500	12500	13000	16000	19000	20000

Regular Fixtures with each Boiler.

Pop safety valve, blow-off, stop and check valves, grates, glass water gauge with three gauge cocks, smoke stack and guys, whistle with valve.

All boilers have necessary handholes and manhole in shell above tubes in boiler 48 inches. in diameter and larger.



Horizontal Tubular Boiler, with Mud Drum and Steam Drum.

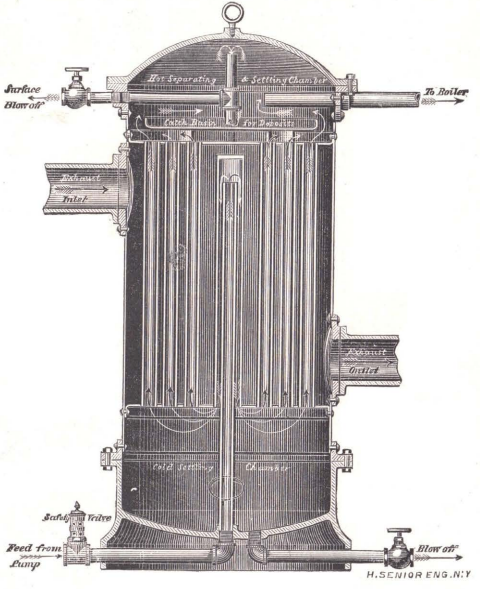
On the opposite page we show a horizontal tubular Boiler with steam drum and mud drum. Each drum is connected to boiler by cast iron nozzles. The nozzles are faced and drilled and supplied with the necessary machine bolts for connecting. We supply a copper gasket for the mud drum nozzle.

The mud drum is supplied with a cast iron cover which can be removed for cleaning. When desired, we can furnish wrought steel necks to connect boiler and drums.

When two or more Boilers are set in a battery, a single drum can be arranged to cross the boilers if desired.

REYNOLDS' PATENT FEED WATER HEATER AND PURIFIER.

We have manufactured and sold these heaters for several years, and at the present time there are over 400 of them in operation. They are strong, well made and durable, and possesses all the advantages of a closed heater; all the exhaust steam passages are amply large to prevent choking and cause back pressure on the engine This heater will effect a saving in fuel which will pay from 40 to 70 per cent. interest annually on its first cost. We furnish heaters of any size, fitted with either brass, copper or iron tubes, always having a full assortment of iron tube heaters in stock.

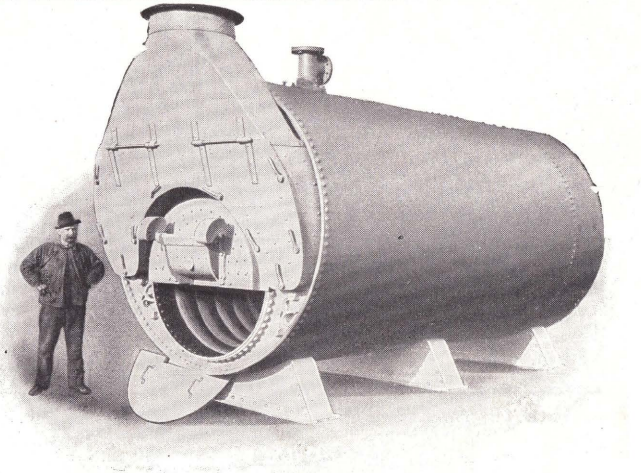


Diameter.	Height	Diameter Exhaust Pipe	TUBES			Horse Power
			Number	Length	Number of Feet	
22	6′ 5″	6″	32	32″	85	42
22	7′ 5″	6″	32	44″	117	58
22	8′ 5″	6″	32	56″	149	74
22	9′ 5″	6″	32	68″	181	90
28	9′	7″	46	60″	230	115
28	10′	7″	46	72″	276	138
28	11′	7″	46	84″	322	161
36	9′ 4″	8″	76	60″	380	190
36	10′ 4″	8″	76	72″	456	228
36	11′ 4″	8″	76	84″	532	266
42	11′	12″	112	72″	672	336
42	12′	12″	112	84″	784	392
42	13′	12″	112	96″	896	448
42	14′	12″	112	108″	1008	504

"CONTINENTAL" BOILERS

With Morison Corrugated Furnaces.

WE have gone to considerable expense in equipping our shop with the heavy machinery necessary to manufacture the Continental internally fired boiler, because we have come to the conclusion, after a careful study of the whole boiler situation, that this type of boiler fully meets the demand for high steam pressure in large units and is free from the objections that are found in every type of bricked-in boiler. In other words, in addition to offering high steam pressures in large units, the "Continental" boiler is free from brick work and the long list of complications that are present in water tube boilers, and is so simple in design that it pays dividends on its saving in repairs compared with other types.



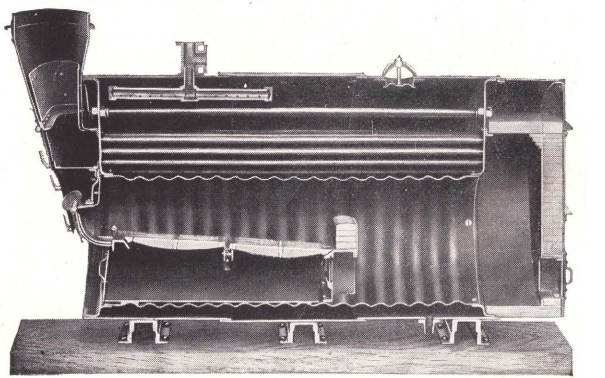
Self-contained—Saving Repair Expense and Radiation Loss.

SAFETY

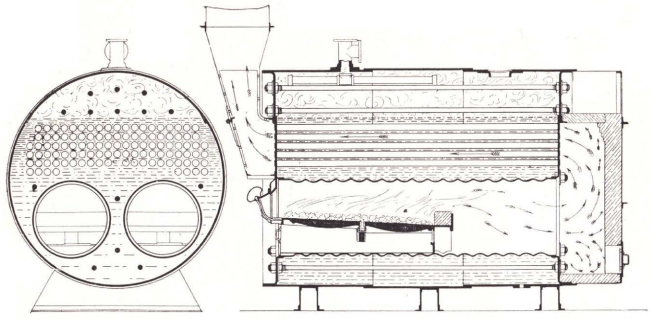
Continental boilers with Morison Corrugated Furnaces are Safe. Though more than twenty-five thousand are in use in this country and abroad, covering a period of approximately twenty years, there is as yet no record of an explosion.

COMBUSTION

These boilers possess a large efficiency of combustion owing to their peculiar design. Combustion in the furnace proper is facilitated by the corrugations of the furnace which serves as baffles to the passage of burning gases; these together with the brick arches causing a thorough admixture of the gases with oxygen of the air. The combustion in the furnace alone is equivalent to that taking place under a tubular or water tube boiler. But, to



Cross Section Showing Furnace, Combustion Chamber and Return tubes.



Note the large Water Space, and consequent Steady Steaming.

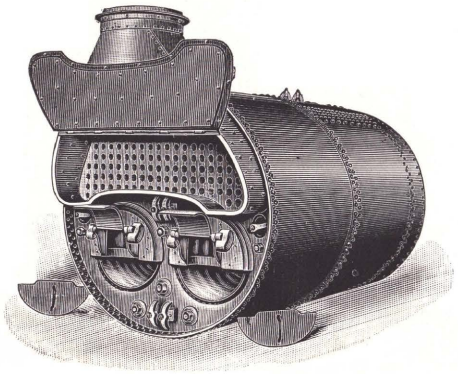
secure still more complete combustion the boiler is provided with a fire brick combustion chamber. Soon after the boiler is fired these fire brick become incandescent and any unconsumed gases or particles of coal that impinge against them are consumed in this combustion chamber.

SMOKE CONSUMPTION

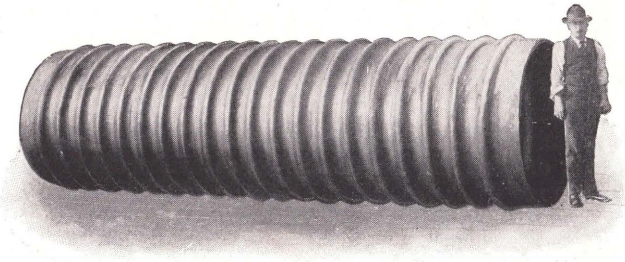
In these days when municipal authorities are prosecuting if not persecuting owners of boilers that smoke, this complete combustion has a special importance in addition to the fact that complete combustion means fuel economy.

IMPORTANCE OF CORRUGATIONS

Not only do the corrugations serve as baffle plates, but they give the furnace the power of resisting seven times the compression stress that would be possible with a plain furnace of the same thickness of material. They also serve as expansion joints permitting the furnace to expand and contract longitudinally with the varrying temperatures that may be present, in this way avoiding the leaks that are inevitable where internal furnaces have not sufficient provision for expansion and contraction. The corrugations also add about one-tenth to the heating surface. Practical experience has shown also that the alternate expansion and contraction of the furnace prevents the deposit of injurious scale on the top of the furnace as the expansion and contaction of the metal tends to loosen such scale.



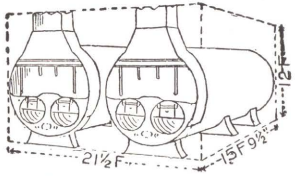
The Two Furnace Type.



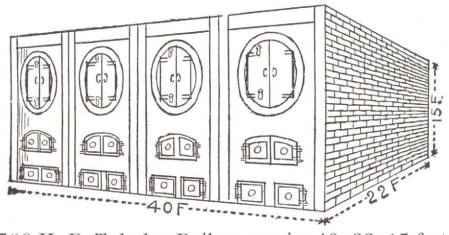
A Morison Corrugated Furnace.

ECONOMY OF SPACE

The Continental boiler can be housed in 60% less floor space and 20% less head room than would be required for an equal number of H. P. required by the tubular or water tube boiler. Take for instance, 500 H. P. This would ordinarily be split up into four 125 H. P. units if tubular boilers were used. These would require a floor space of 40x22x15′ with 15′ head room. The water tube boiler would require about the same cubical space. 500 H. P. in the Continental boiler would be best divided into two 250 H. P. units allowing for space between the boilers. These two would occupy 21½′x15′ 9½″ floor space and 12′ high. This economy of space coupled with high efficiency and fuel economy accounts for the fact that the internally fired boiler with corrugated furnaces is used in 90% of the world's modern sea going vessels.



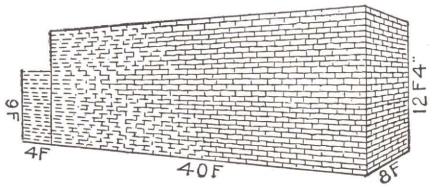
500 H. P. Corrugated Furnace Boilers housed in 21½x15:9½x12 feet.



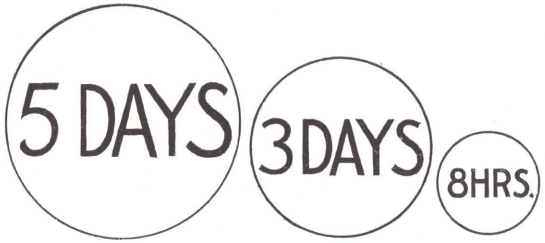
500 H. P. Tubular Boilers require 40x22x15 feet.

HEATS WATER NOT BRICKS

A battery of 500 H. P. tubular boilers would require 102,000 common brick and 6,000 fire brick. It costs money to heat a pile of brick of this kind and it takes time to cool it. The heat generated in a "Continental" boiler goes into the water that completely surrounds every fire surface instead of into a pile of brick. Even when the brick masonry on a tubular or water tube boiler is perfectly new the ratiation from the brick involves a loss in heat that is estimated at from 10% to 20%. When the brick setting becomes cracked this heat loss is still greater.



Over 230 TONS of Brick to Heat and Cool for every 500 H. P. Tubular Boilers.



To cool and clean 500 H. P. Water Tube Boiler. To cool and clean 500 H. P. Tubular Boiler. To cool and clean 500 H. P. Continental Boilers.

TIME SAVED IN CLEANING

To draw fires, cool the masonry work and metals in the watertube boiler, remove and replace all the caps and gaskets, clean and get the boiler into service again, reqiures four to five *days*' time and labor; the brick-set tubular boiler, over half as much time. The same result may be accomplished with the Morison Corrugated Furnace Boiler, in six to eight *hours*. In ordinary practice, where, say, 1000 h. p. is required to drive the load, 1600 h. p. water-tube boiler capacity must be supplied in order to leave time for cleaning, while with the Morison Corrugated Furnace Boiler one-third as much idle investment is required to give plenty of reserve capacity in the plant, while about one-tenth the labor and cost of cleaning will answer.

Specifications of Internally Fired Boilers.

Rated Horse Power	75				100				125			
Steam Pressure.....Pounds	100	130	160	200	100	130	160	200	100	130	160	200
Inside Dia. Boiler Shell.....Inches	78	78	78	78	84	84	84	84	90	90	90	90
Length of Boiler over all	14′ 8″	14′ 9″	14′ 8¼″	14′ 9″	15′ 8¼″	15′ 8″	15′ 8¼″	15′ 9″	15′ 8¾″	15′ 8¼″	15′ 9″	15′ 9¼″
Diameter of Tubes.....Inches	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½
Number of Tubes	42	42	42	42	56	56	56	56	70	70	70	70
Length of Tubes	11′ 6″	11′ 6″	11′ 6″	11′ 6″	12′ 6″	12′ 6″	12′ 6″	12′ 6″	12′ 6″	12′ 6″	12′ 6″	12′ 6″
Thickness of Shell.....Inches	13/32	17/32	17/32	11/16	7/16	15/32	19/32	23/32	15/32	½	5/8	25/32
Thickness of Heads	9/16	5/8	11/16	¾	9/16	5/8	11/16	¾	9/16	5/8	11/16	¾
Number of Furnaces	1	1	1	1	1	1	1	1	1	1	1	1
Inside Dia. of Furnace.....Inches	36	36	36	36	38	38	38	38	45	45	45	45
Thickness of Furnace.....Inches	5/16	11/32	13/32	17/32	5/16	3/8	7/16	9/16	11/32	7/16	17/32	21/32
Grate Surface.....Sq. ft.	15	15	15	15	20	20	20	20	25	25	25	25
Length of Grate	5′ 0″	5′ 0″	5′ 0″	5′ 0″	6′ 4″	6′ 4″	6′ 4″	6′ 4″	6′ 8″	6′ 8″	6′ 8″	6′ 8″
Heating Surface.....Sq. ft.	527	527	527	527	733	733	733	733	905	905	905	905
Dia. of Stack.....Inches	24	24	24	24	27	27	27	27	30	30	30	30
Total Weight without Stack.....Pounds	15200	17500	19000	22000	19000	21500	24500	26500	22200	24200	26500	30200
Fire Brick in Lining	450	450	450	450	530	530	530	530	600	600	600	600

Specifications of Internally Fired Boilers.

Rated Horse Power	150				200				250				300			
Steam Pressure.....Pounds	100	130	160	200	100	130	160	200	100	130	160	200	100	130	160	200
Inside dia. Boiler Shell, ...Inches	96	96	96	96	114	114	114	114	126	126	126	126	138	138	138	138
Length of Boiler over all.....	16′ 2¾″	16′ 2¼″	16′ 3″	16′ 3¼″	15′ 9″	15′ 9½″	15′ 10″	15′ 10½″	15′ 9″	15′ 9½″	15′ 10½″	15′ 11″	16′ 3″	16′ 4″	16′ 4½″	16′ 5½″
Dia. of Tubes.....Inches	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½
Number of Tubes.....	80	80	80	80	108	108	108	108	137	137	137	137	161	161	161	161
Length of Tubes.....	13′ 0″	13′ 0″	13′ 0″	13′ 0″	12′ 6″	12′ 6″	12′ 6″	12′ 6″	12′ 6″	12′ 6″	12′ 6″	12′ 6″	13′ 0″	13′ 0″	13′ 0″	13′ 0″
Thickness of Shell.....Inches	½	17/32	21/32	13/16	½	5/8	25/32	31/32	17/32	23/32	7/8	1 3/32	19/32	25/32	15/16	1 3/16
Thickness of Heads.....Inches	9/16	5/8	11/16	¾	9/16	5/8	11/16	¾	9/16	5/8	11/16	¾	9/16	5/8	11/16	¾
Number of furnaces.....	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
Inside Dia. of Furnace, Inches	50	50	50	50	38	38	38	38	45	45	45	45	50	50	50	50
Thickness of Furnace, Inches	3/8	15/32	9/16	23/32	5/16	3/8	7/16	9/16	11/32	7/16	17/32	21/32	3/8	15/32	9/16	23/32
Grate Surface.....Sq. ft.	30	30	30	30	40	40	40	40	50	50	50	50	60	60	60	60
Length of Grate.....	7′ 3″	7′ 3″	7′ 3″	7′ 3″	6′ 4″	6′ 4″	6′ 4″	6′ 4″	6′ 8″	6′ 8″	6′ 8″	6′ 8″	7′ 3″	7′ 3″	7′ 3″	7′ 3″
Heating Surface.....Sq. ft.	1071	1071	1071	1071	1423	1423	1423	1423	1780	1780	1780	1780	2157	2157	2157	2157
Dia. of Stack.....Inches	32	32	32	32	34	34	34	34	38	38	38	38	41	41	41	41
Total weight without stack, pounds	26000	28000	31200	35000	33500	37200	42000	47500	42000	48000	54000	65000	50000	54000	60500	71000
Fire Brick in Lining.....	730	730	730	730	1300	1300	1300	1300	1550	1550	1550	1550	1900	1900	1900	1900

SHEET STEEL SMOKE STACKS.

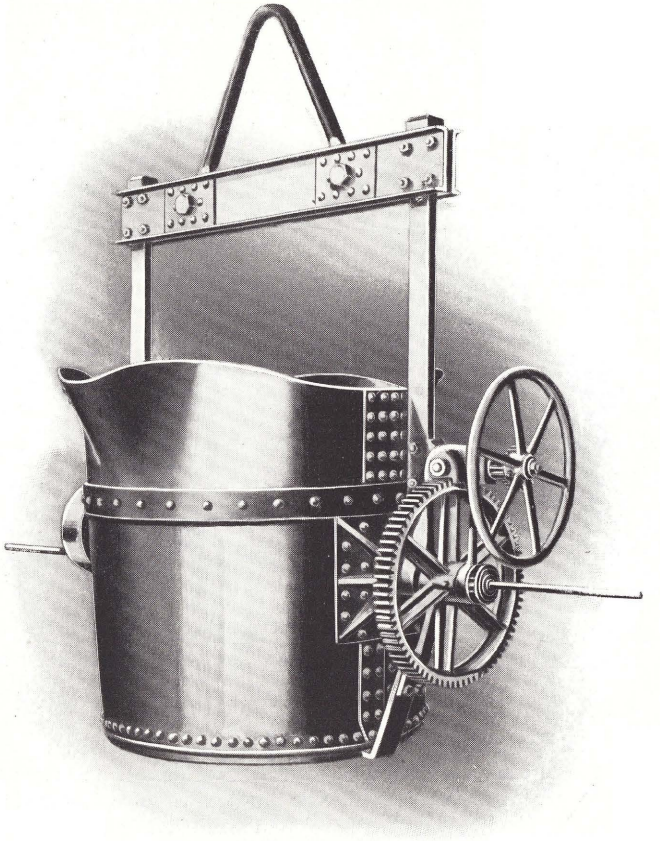
Weights per Lineal Foot for Different Diameters and Thickness.

Dia. of Stack.....in inches	10	11	12	13	14	15	16	18	20	22	24	26	28	30	32	34	36	42	46	50
No. 16 B. W. G , weight in lbs.	7½	8¼	9	9¾	10½	11	11¾	13¼	14½	16	17¼	18¾	20¼	21½	23	24½	26	30	32½	35½
No. 14 B. W. G., weight in lbs.	9½	10½	11½	12½	13¼	14¼	15¼	17	19	20¾	22½	24¼	26	28	29¾	31½	33½	39	42¼	46
No. 12 B. W. G., weight in lbs	12½	13½	14¾	16	17	18¼	19½	21¾	24	26½	29	31¼	33½	36	38¼	40¾	43	50	54½	59
No. 10 B. W. G., weight in lbs.	15¼	16½	18	19½	21	22¼	23¾	26¾	29½	32½	35	38	41	44	46¾	49½	52½	61	66½	72
No. 8 B. W. G., weight in lbs.	18¾	20¼	22	24	25½	27¼	29¼	32¾	36¼	40	43¼	46¾	50¼	54	57½	61	64½	75	82	89½
3/16 inch Plate, weight in lbs.	21¼	23¼	25¼	27½	29½	31¼	33¼	37½	41¼	45½	49½	53½	57½	61½	65½	69½	74	85½	93	101

SMOKE CONNECTIONS.

Our standard boiler setting, where two or more boilers are set in one battery, requires a horizontal smoke flue with the stack set on a brick base, three feet beyond the outside wall of the setting. We do not insist on this plan, but will make and furnish smoke connections to suit the conditions existing in any location. With a single boiler a side breeching is not included unless specified.

All smoke connections are made of heavy sheet steel, well reinforced with angle irons and thoroughly braced.

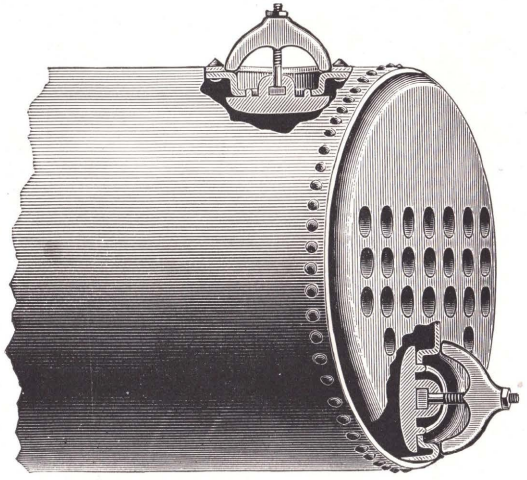


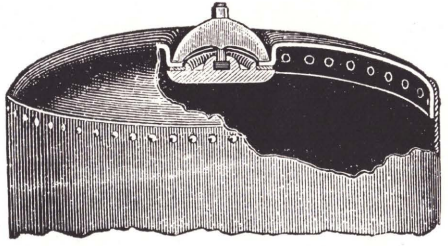
25 Ton Foundry Ladle.

We manufacture ladles for all purposes and of all sizes.

IDEAL MAN HOLE.

Patented March 17, 1896.





The above cuts show the Ideal Man Hole as used by us in the heads and shell of Boilers and Tanks. This Man Hole is made by forming the hole in such a way that the flange of the opening is parallel with the man head instead of at right angles to it, thus making a perfectly rigid flange. By this means we secure a broad flat bearing surface, capable of forming a steam tight joint with but little wear on the gasket, and easily permitting the removal and replacing of man head without any danger of a leaky joint, as is so common with other man holes.

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